MISB MOTION IMAGERY STANDARDS BOARD	MISB ST 0902.4
STANDARD	
Motion Imagery Sensor Minimum Metadata Set	23 October 2014

1 Scope

This Standard defines the Motion Imagery Sensor Minimum Metadata Set (MISMMS) that enables the basic capabilities of Situational Awareness, Discovery & Retrieval, and Cross-Domain Dissemination. In addition, it provides direction on the encoding of the MISMMS for low-bitrate to high-bitrate scenarios to support a transition path from analog systems towards all digital motion imagery systems.

2 References

2.1 Normative References

The following references and the references contained therein are normative.

[1] MISP-2015.1, Motion Imagery Standards Profile, Oct 2014
[2] MISB ST 0601.8, UAS Datalink Local Set, Oct 2014
[3] MISB ST 0102.11, Security Metadata Universal and Local Sets for Digital Motion Imagery, Oct 2014
[4] MISB ST 1204.1, Motion Imagery Identification System (MIIS) – Core Identifier, Oct 2013
[5] MISB ST 0107.2, Bit and Byte Order for Metadata in Motion Imagery Files and Streams, Feb 2014

2.2 Informative References

N/A

3 Terms, Acronyms and Definitions

HAE Height above Ellipsoid
LS Local Set
MISMMS Motion Imagery Sensor Minimum Metadata Set
MSL Mean Sea Level

4 Revision History

Revision	Date	Summary of Changes
0902.4	10/23/2014	• Updated column entitled Length in Table 1 to agree with new SMPTE 335:2012 philosophy and MISB ST 0102.11; added Note to Table 2 to explain Length values; updated references to latest versions

5 Introduction, Intent, and General Implementation Rules

The MISMMS consists of metadata elements from MISB ST 0601[2] that enable the baseline functionality required for Discovery & Retrieval / Cross-Domain Dissemination of source imagery and the Situational Awareness Product for ISR mission accomplishment as defined in the MISP[1].

The initial MISMMS was developed jointly by the Motion Imagery Standards Board (MISB), NITFS Technical Board (NTB), NGA Interoperability Action Team (NIAT), and Metadata Focus Group (MFG) with additional subject matter expert input from U.S. Central Command (USCENTCOM), NATO Standardization Agreement (STANAG) 4586, and the Unmanned Systems community.

As motion imagery systems begin to migrate to all-digital architectures, there are still some systems in transition which require the consistent preservation of certain analog system characteristics. This Standard identifies a way to encode the original, source-derived metadata from a motion imagery sensor into a standard KLV digital metadata set.

6 Motion Imagery Sensor Minimum Metadata Set

The intent of the MISMMS is to profile MISB ST 0601 as a Local Set representation with all elements mandatory unless conditionally dependent.

Requirement	
ST 0902.3-01	All metadata shall be expressed in accordance with MISB ST 0107[5].
ST 0902.3-02	The MISMMS shall use MISB ST 0601[2] Local Set 16-byte Universal Key (06.0E.2B.34.02.0B.01.01.0E.01.03.01.01.00.00.00 (CRC 56773)) for its implementation.
ST 0902.3-03	The elements of the MISMMS as defined in MISB ST 0902 Table 1 shall be populated in accordance with MISB ST 0601 requirements.
ST 0902.3-04	All metadata elements contained in the MISMMS shall be reported no less than once every thirty (30) seconds under all circumstances.

Please refer to MISB ST 0601[2] for further information on each element. Of interest, Tag 48 of MISB ST 0601 contains a nested security Local Set as defined in MISB ST 0102[3]. Please refer

to MISB ST 0102 for further information regarding each security element. MISB ST 0601 also contains reference to a Motion Imagery Core Identifier as defined in MISB ST 1204[4]. Please refer to MISB ST 1204 for further information regarding the Motion Imagery Core Identifier.

Note 1: Platform Pitch Angle (Tag 6 | 90), Platform Roll Angle (Tag 7 | 91), Sensor True Altitude as MSL (Tag 15) | Sensor Ellipsoid Height as HAE (Tag 75), and Frame Center Elevation as MSL (Tag 25) | Frame Center Height Above Ellipsoid (Tag 78) are governed by an "inclusive or" within MISB ST 0601.

Note 2: Motion Imagery Core Identifier (Tag 94) is required as the Motion Imagery data is disseminated from the "system" where the system is the composite of the platform and control station (*i.e.* Ground Control Station).

Table 1: Summary of MISMMS Tags

Tag #	Tag Name	Range & Units	Length (Bytes)
1	Checksum	None	2
2	UNIX Time Stamp	Microseconds	8
3	Mission ID	String	1-127
5	Platform Heading Angle	0-360 Degrees	2
6	Platform Pitch Angle (Short)	+/- 20 Degrees	2
90	Platform Pitch Angle (Full)	+/- 90 Degrees	4
7	Platform Roll Angle (Short)	+/- 50 Degrees	2
91	Platform Roll Angle (Full)	+/- 90 Degrees	4
10	Platform Designation	String	1-127
11	Image Source Sensor	String	1-127
12	Image Coordinate System	String	1-127
13	Sensor Latitude	+/- 90 Degrees	4
14	Sensor Longitude	+/- 180 Degrees	4
15 | 75	Sensor True Altitude (MSL) Sensor Ellipsoid Height (HAE)	-900 to 19000m	2
16	Sensor Horizontal FoV	0 to 180 Degrees	2
17	Sensor Vertical FoV	0 to 180 Degrees	2
18	Sensor Relative Azimuth Angle	0 to 360 Degrees	4
19	Sensor Relative Elevation Angle	+/- 180 Degrees	4
20	Sensor Relative Roll Angle	0 to 360 Degrees	4
21	Slant Range	0 to 5000000 m	4
22	Target Width	0 to 10000 m	2
23	Frame Center Latitude	+/0 90 Degrees	4
24	Frame Center Longitude	+/- 180 Degrees	4
25 | 78	Frame Center Elevation (MSL) Frame Center Height Above Ellipsoid (HAE)	-900 to 19000 m	2
48/1	Security Classification	Look Up Table	1
48/2	Classifying Country & Releasing Instructions Country Coding Method	Look Up Table	1

48/3	Classifying Country	String	Variable
48/4	Security-SCI/SHI Information	String	Variable
48/5	Caveats	String	Variable
48/6	Releasing Instructions	String	Variable
48/12	Object Country Coding Method	Look Up Table	1
48/13	Object Country Codes	String	Variable
48/22	Security Metadata Version	Integer	2
65	UAS Local Set Version	Integer	1
94	Motion Imagery Core Identifier	None	50

7 Annex A: Recommended MISMMS Element Frequency – Informative

This section addresses the presence and frequency of individual data elements within the MISMMS.

Some metadata elements change more rapidly than others. When sending metadata in bandwidth-constrained environments, it is more efficient to dedicate the bulk of the available bandwidth to the dynamic items ("Dynamic") with rapidly changing values, and include the constant items ("Constant") less often. This section provides guidance in the form of a "*recommended update rate*" for each element of the MISMMS.

Some of the security metadata elements may be omitted as they are conditional. Further direction on this topic is found in MISB ST 0102.

Recommendation Summary for MISMMS Frequency (see Table 2):

1. Include Tags 3, 10, 11, 12, 48 sub-tags & 94 once every 10 seconds
2. Include all other elements as often as possible, within the available bandwidth and up to the frame rate

The rate at which "Dynamic" items update varies depending on the available bandwidth of the system, and how frequently the metadata values are refreshed. In some systems, it is desirable to have metadata updated for each motion imagery frame. For a specific worked example, see Annex B: Example MISMMS Element Rate Calculations – Informative.

Please note, it is not mandatory to make each metadata packet contain every metadata element; this bandwidth study demonstrates the viability of transmitting the MISMMS in a bandwidth-constrained environment. If the bandwidth supports it, other metadata packet configurations (*e.g.* more packets each containing fewer elements) are permissible.

Table 2: Recommended Update Rate for MISMMS Elements

Tag #	Tag Name	Max Length (Bytes)	Rec Update Interval
1	Checksum	2	Fast
2	UNIX Time Stamp	8	Fast
3	Mission ID	127	10 s
5	Platform Heading Angle	2	Fast
6 | 90	Platform Pitch Angle (Short) Platform Pitch Angle (Full)	2 4	Fast Fast
7 | 91	Platform Roll Angle (Short) Platform Roll Angle (Full)	2 4	Fast Fast
10	Platform Designation	127	10 s
11	Image Source Sensor	127	10 s
12	Image Coordinate System	127	10 s
13	Sensor Latitude	4	Fast

14	Sensor Longitude	4	Fast
15 | 75	Sensor True Altitude (MSL) Sensor Ellipsoid Height (HAE)	2	Fast
16	Sensor Horizontal FoV	2	Fast
17	Sensor Vertical FoV	2	Fast
18	Sensor Relative Azimuth Angle	4	Fast
19	Sensor Relative Elevation Angle	4	Fast
20	Sensor Relative Roll Angle	4	Fast
21	Slant Range	4	Fast
22	Target Width	2	Fast
23	Frame Center Latitude	4	Fast
24	Frame Center Longitude	4	Fast
25 | 78	Frame Center Elevation (MSL) Frame Center Height Above Ellipsoid (HAE)	2	Fast
48/1	Security Classification	1	10 s
48/2	Classifying Country & Releasing Instructions Country Coding Method	1	10 s
48/3	Classifying Country	6*	10 s
48/4	Security-SCI/SHI Information	40*	10 s
48/5	Caveats	32*	10 s
48/6	Releasing Instructions	40*	10 s
48/12	Object Country Coding Method	1	10 s
48/13	Object Country Codes	40*	10 s
48/22	Security Metadata Version	2	10 s
65	UAS Local Set Version	1	Fast
94	Motion Imagery Core Identifier	50	10 s

Note 3: * indicates the maximum length for these elements are only representative for the example in Appendix B as MISB ST 0102 does not define a maximum length.

8 Annex B: Example MISMMS Element Rate Calculations – Informative

This section provides bandwidth budget calculations, assuming a 9600 bits-per-second channel for metadata.

Calculations are presented for two general scenarios:

1. Scenario 1: Assumes all content is present in each KLV packet
2. Scenario 2: Assumes all content is not present in each KLV packet

8.1 Scenario 1: All Content Always Present

Worst Case: 18 bytes (16-byte Local Set UL Key + 2-byte Local Set Length) + 77 bytes (37 1-byte Tags, 37 1-byte Lengths & Security Local Set (1-byte Tag & 2-byte Length)) + 792 bytes (Payload) = 887 bytes = 7096 bits. Assuming serial transmission overhead of 1 start bit and 1 stop bit per byte, there are 8870 bits total. This allows for one metadata update per second at 9600 bits per second.

Typical Case: Limit Strings to 20 bytes, eliminate Tags 6, 7, 15 & 25, and reduce MIIS to 34 bytes. 18 bytes (16-byte Local Set UL Key + 2-byte Local Set Length) + 68 bytes (33 1-byte Tags, 33 1-byte Lengths & Security Local Set (1-byte Tag & 1-byte Length)) + 268 bytes (Payload) = 354 bytes = 2832 bits. Serial overhead factor of 1.25 assumed, yielding 3540 bits total. Enables two metadata updates per second at 9600 bits per second.

8.2 Scenario 2: Content Present at Variable Rates

If the data rates of individual metadata elements are varied, there are more options. In particular, Table 3 shows rate calculations when the constraints in the Typical Case are combined with the update rates of Table 2.

Table 3: Rate Calculation for "Dynamic Only" & "Dynamic & Constant" Packets

Description	Totals	"Dynamic Only"	"Dynamic & Constant"
Bytes for Data Fields		63	268
Bytes for Local Set Key & Length		17	18
Bytes for Tags & Lengths		38	68
Bytes to Transmit		118	354
Bits to Transmit		944	2832
Bits for Serial Overhead[1] for 8-N-1		236	708
Bits Sent per KLV Packet		1180	3540
Bits / 10 s Interval @ 9600 bits per second	96000		
Bits Remaining After "Dynamic & Constant" Packet	92460		
"Dynamic Only" Packets / 10 s Interval	78.355		
Whole "Dynamic Only" Packets / 10 s Interval	78		

[1] Assumes serial (RS-232 or RS-485) transmission with 1 start bit, 0 parity bits, and 1 stop bit for each byte (*i.e.* 10 bits transmitted for every 8 bits of data)

That is, in a 10-second interval, it is possible to send 1 “Dynamic & Constant” MISMMS packet followed by 78 “Dynamic Only” MISMMS packets.

If each packet (“Dynamic Only” or “Dynamic & Constant”) is separated by an equal sized gap in time, then the rate calculations are as shown in Table 4:

Table 4: Rate Calculation for “Dynamic Only” & “Dynamic & Constant” Packets with Gaps

Description	Totals
Whole “Dynamic Only” Packets / 10 s	78
Bits / 10 s @ 9600 bits per second	96000
Bits / 78 “Dynamic Only” Packets	92040
Bits / 1 “Dynamic & Constant” Packet	3540
Bits Remaining	420
# of Gaps	79
Bits / Gap	5.31645
Gap Time @ 9600 bps (microseconds)	553.79746

This packet schedule repeats every 10 seconds. Figure 1 illustrates:

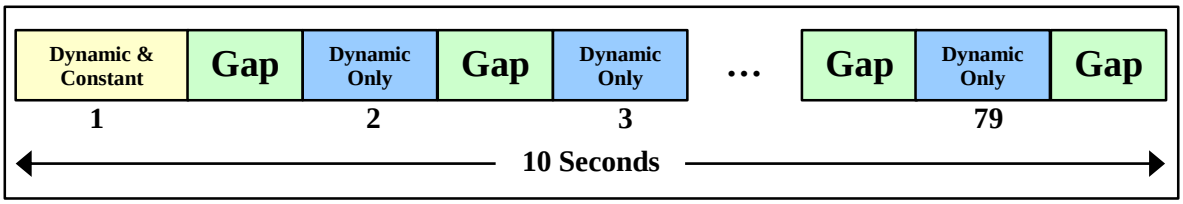

Figure 1: Time Interval with “Dynamic Only” Packets and Gaps

9 Annex C: Example MISMMS Data Packets – Informative

This section constructs hypothetical example MISMMS data packets and presents the encoding. All values shown in Table 5 are for illustration purposes only. The Tag-Length-Value (TLV) encoded data are shown as hexadecimal bytes.

Table 5: Example "Dynamic & Constant" MISMMS Packet Data

Tag #	Tag Name	Value	Interpretation	TLV Hex Bytes
2	UNIX Time Stamp	1,231,798,102,000,000 microseconds	Mon Jan 12 2009 22:08:22 (UTC)	02 08 00 04 60 50 58 4E 01 80
3	Mission ID	Mission 12	Mission 12	03 0A 4D 69 73 73 69 6F 6E 20 31 32
5	Platform Heading Angle	0x71C2	159.9744 Degrees	05 02 71 C2
6	Platform Pitch Angle (Short)	0xFD3D	-0.4315251 Degrees	06 02 FD 3D
7	Platform Roll Angle (Short)	0x08B8	3.405814 Degrees	07 02 08 B8
10	Platform Designation	Predator	Predator	0A 08 50 72 65 64 61 74 6F 72
11	Image Source Sensor	EO Nose	EO Nose	0B 07 45 4F 20 4E 6F 73 65
12	Image Coordinate System	Geodetic WGS84	Geodetic WGS84	0C 0E 47 65 6F 64 65 74 69 63 20 57 47 53 38 34
13	Sensor Latitude	0x5595B66D	60.17682296 Degrees	0D 04 55 95 B6 6D
14	Sensor Longitude	0x5B5360C4	128.42675904 Degrees	0E 04 5B 53 60 C4
15	Sensor True Altitude (MSL)	0xC221	14190.72 Meters	0F 02 C2 21
16	Sensor Horizontal FoV	0xCD9C	144.5713 Degrees	10 02 CD 9C
17	Sensor Vertical FoV	0xD917	152.6436 Degrees	11 02 D9 17
18	Sensor Rel. Az. Angle	0x724A0A20	160.71921147 Degrees	12 04 72 4A 0A 20
19	Sensor Rel. El. Angle	0x87F84B86	-168.79232483 Degrees	13 04 87 F8 4B 86
20	Sensor Rel. Roll Angle	0x00000000	0.0 Degrees	14 04 00 00 00 00
21	Slant Range	0x03830926	68590.98 Meters	15 04 03 83 09 26
22	Target Width	0x1281	722.8199 Meters	16 02 12 81
23	Frame Center Lat.	0xF101A229	-10.54238863	17 04 F1 01 A2 29
24	Frame Center Lon.	0x14BC082B	29.15789012 Degrees	18 04 14 BC 08 2B
25	Frame Center El. (MSL)	0x34F3	3216.037 Meters	19 02 34 F3
48/1	Security Classification	0x01	UNCLASSIFIED//	01 01 01
48/2	Classifying Country and Releasing Instructions Country Coding Method	0x07	STANAG-1059 Three Letter	02 01 07

48/3	Classifying Country	//USA	//USA	03 05 2F 2F 55 53 41
48/4	Security-SCI/SHI Information	<None>	<None>	
48/5	Caveats	<None>	<None>	
48/6	Releasing Instructions	<None>	<None>	
48/12	Object Country Coding Method	0x07	STANAG-1059 Three Letter	0C 01 07
48/13	Object Country Codes	\u0055\u0053\u0041	USA	0D 06 00 55 00 53 00 41
48/22	Security Metadata Version	10	MISB Standard 0102.10	16 02 00 0A
65	UAS Local Set Version	0x06	MISB Standard 0601.6	41 01 06
94	Motion Imagery Core Identifier			5E 22 01 70 F5 92 F0 23 73 36 4A F8 AA 91 62 C0 0F 2E B2 DA 16 B7 43 41 00 08 41 A0 BE 36 5B 5A B9 6A 36 45
1	Checksum	0xAA43	0xAA43	01 02 AA 43

The TLV bytes are appended end-to-end, and together form the value portion of the encompassing KLV packet. In the “Dynamic & Constant” packet, there are 210 bytes of TLV data – encoded as the length of the KLV packet. Lengths up to 127 bytes are encoded as the BER short form length. Lengths of 128 bytes or higher are encoded as the BER long form length. In this case, 210 bytes is encoded as the BER long form length of 0x81D2.

The Local Set begins with its 16-byte UL key, followed by the length of the data set (0x81D2), which is then followed by the TLV value bytes listed above in order. In hex, the complete MISMMS “Dynamic & Constant” example KLV packet is:

```
06 0E 2B 34 02 0B 01 01 0E 01 03 01 01 00 00 00
81 D2 02 08 00 04 60 50 58 4E 01 80 03 0A 4D 69
73 73 69 6F 6E 20 31 32 05 02 71 C2 06 02 FD 3D
07 02 08 B8 0A 08 50 72 65 64 61 74 6F 72 0B 07
45 4F 20 4E 6F 73 65 0C 0E 47 65 6F 64 65 74 69
63 20 57 47 53 38 34 0D 04 55 95 B6 6D 0E 04 5B
53 60 C4 0F 02 C2 21 10 02 CD 9C 11 02 D9 17 12
04 72 4A 0A 20 13 04 87 F8 4B 86 14 04 00 00 00
00 15 04 03 83 09 26 16 02 12 81 17 04 F1 01 A2
29 18 04 14 BC 08 2B 19 02 34 F3 30 1C 01 01 01
02 01 07 03 05 2F 2F 55 53 41 0C 01 07 0D 06 00
55 00 53 00 41 16 02 00 0A 41 01 06 5E 22 01 70
F5 92 F0 23 73 36 4A F8 AA 91 62 C0 0F 2E B2 DA
16 B7 43 41 00 08 41 A0 BE 36 5B 5A B9 6A 36 45
01 02 AA 43
```

Legend

- **Key (16 byte SMPTE Universl Label**
- **Length (BER long form)**
- **Length (BER short form)**
- **Tag (Local Set Identifier)**
- **Value (Interpretation depends on tag data type)**
- **Grid Patterned Colors (Denotes nested metadata Set)**

The next example, which uses the values in Table 6, illustrates the details of a hypothetical "Dynamic Only" MISMMS data packet.

Table 6: Example "Dynamic Only" MISMMS Packet Data

Tag #	Tag Name	Value	Interpretation	TLV Hex Bytes
2	UNIX Time Stamp	1,231,798,102,000,000 microseconds	Mon Jan 12 2009 22:08:22 (UTC)	02 08 00 04 60 50 58 4E 01 80
5	Platform Heading Angle	0x71C2	159.9744 Degrees	05 02 71 C2
6	Platform Pitch Angle (Short)	0xFD3D	-0.4315251 Degrees	06 02 FD 3D
7	Platform Roll Angle (Short)	0x08B8	3.405814 Degrees	07 02 08 B8
13	Sensor Latitude	0x5595B66D	60.17682296 Degrees	0D 04 55 95 B6 6D
14	Sensor Longitude	0x5B5360C4	128.42675904 Degrees	0E 04 5B 53 60 C4
15	Sensor True Altitude (MSL)	0xC221	14190.72 Meters	0F 02 C2 21
16	Sensor Horizontal FoV	0xCD9C	144.5713 Degrees	10 02 CD 9C
17	Sensor Vertical FoV	0xD917	152.6436 Degrees	11 02 D9 17
18	Sensor Rel. Az. Angle	0x724A0A20	160.71921147 Degrees	12 04 72 4A 0A 20
19	Sensor Rel. El. Angle	0x87F84B86	-168.79232483 Degrees	13 04 87 F8 4B 86
20	Sensor Rel. Roll Angle	0x00000000	0.0 Degrees	14 04 00 00 00 00
21	Slant Range	0x03830926	68590.98 Meters	15 04 03 83 09 26
22	Target Width	0x1281	722.8199 Meters	16 02 12 81
23	Frame Center Lat.	0xF101A229	-10.54238863	17 04 F1 01 A2 29
24	Frame Center Lon.	0x14BC082B	29.15789012 Degrees	18 04 14 BC 08 2B
25	Frame Center El. (MSL)	0x34F3	3216.037 Meters	19 02 34 F3
65	UAS Local Set Version	0x06	MISB Standard 0601.6	41 01 06
1	Checksum	0xC850	0xC850	01 02 C8 50

Again, the TLV value bytes are appended end-to-end; together they form the value portion of the encompassing KLV packet. In the "Dynamic Only" packet, there are 97 bytes of TLV data – encoded as the length of the KLV packet. As the length of 97 bytes is less than 128 bytes, it is encoded as the BER short form length of 0x61.

The Local Set begins with its 16-byte UL key, followed by the length 0x61, which is then followed by all the TLV value bytes as listed above in order. In hex, the complete MISMMS "Dynamic Only" example KLV packet is:

06	0E	2B	34	02	0B	01	01	0E	01	03	01	01	00	00	00
61	02	08	00	04	60	50	58	4E	01	80	05	02	71	C2	06
02	FD	3D	07	02	08	B8	0D	04	55	95	B6	6D	0E	04	5B
53	60	C4	0F	02	C2	21	10	02	CD	9C	11	02	D9	17	12
04	72	4A	0A	20	13	04	87	F8	4B	86	14	04	00	00	00
00	15	04	03	83	09	26	16	02	12	81	17	04	F1	01	A2
29	18	04	14	BC	08	2B	19	02	34	F3	41	01	06	01	02
C8	50														

Legend

- Key (16 byte SMPTE Universl Label
- Length (BER long form)
- Length (BER short form)
- Tag (Local Set Identifier)
- Value (Interpretation depends on tag data type)

10 Annex D: Basis for Metadata Inclusion in MISMMS – Informative

This section provides motivation for the inclusion of each item in the MISMMS. Please note that the metadata tags enumerated herein constitute the threshold set to meet two primary ISR missions. Users needing additional elements are encouraged to use other elements from MISB ST 0601 or other MISB metadata elements as appropriate.

In general, the MISMMS is designed to support two primary missions: Discovery & Retrieval (D&R) and ISR Situational Awareness (ISR SA). The D&R mission refers to storage of motion imagery within an archive, and in particular, subsequent search and access to the archive.

SA is defined in the MISP as "the human perception of the elements of the operational environment in the context of the forces, space, and time, the comprehension of their meaning, and the projection of their status in the near future." SA is subjective; it is perhaps easier to define SA Product in objective terms.

The MISP defines a SA Product as "a concise, transportable summary of the state of friendly and enemy elements conveyed through information such as full-motion video (FMV), imagery, or other data that can contribute to the development of SA either locally or at some distant node."

In other words, a SA Product is a collection of those objectives – quantifiable pieces of information that assist someone in the formations of SA for a specific context. In the context of ISR, a SA Product answers three questions regarding an asset: *who* is it, *where* is it, and *what* is it doing?

Elements from MISB ST 0601 have been chosen as needed to support the D&R and ISR SA tasks as follows:

Checksum (Tag 1): This element is necessary to ensure the data contained in an instance of a MISB ST 0601 Local Set has not been corrupted during transmission.

UNIX Time Stamp (Tag 2): This element is necessary as it addresses the time for which all other elements in a given MISB ST 0601 Local Set are valid – geospatial information must have a temporal component.

Mission ID (Tag 3): This element is the basis for many D&R queries.

Platform Heading / Platform Pitch / Platform Roll (Tags 5, 6 | 90, 7 | 91): These elements define the orientation of an airborne asset which can be used to predict its future position.

Platform Designation (Tag 10): This element supports both D&R queries and ISR SA regarding the presence of friendly assets.

Image Source Sensor (Tag 11): As some platforms have multiple sensors, information that addresses what sensor is used refines the information included under Platform Designation (Tag 10) for both D&R and ISR SA.

Image Coordinate System (Tag 12): Defines a reference coordinate system for all measurements related to the Earth. It is an essential element in clearly defining measurements such as Latitude, Longitude, elevation, altitude, etc. fundamental to D&R and ISR SA.

Sensor Latitude / Sensor Longitude / Sensor Altitude (Tags 13, 14, 15 | 75): These elements define the position of the active sensor and can be combined with Platform heading / pitch / roll to predict future position of the sensor.

Sensor Field of View-Horizontal / Sensor Field of View-Vertical (Tags 16-17): These two elements define the size of the field-of-view of the active sensor. This supports D&R queries related to pixel resolution of the target and ISR SA by assisting in defining the area of interest for the asset.

Sensor Relative Azimuth Angle / Sensor Relative Elevation Angle / Sensor Relative Roll Angle (Tags 18-20): When combined with Platform Heading, Pitch & Roll, these elements comprise the composite pointing vector of the sensor which is a key component of ISR SA.

Slant Range (Tag 21): While this information can be derived from other information regarding the position & orientation of the platform along with a terrain model, an independent measurement of the slant range to the target (or image center) improves confidence in the position knowledge.

Target Width (Tag 22): This element provides the analyst a quick reference of scale and ground sample distance of a primary object within the viewing area. It is a component of ISR SA.

Frame Center Latitude / Frame Center Longitude / Frame Center Elevation (Tags 23, 24, 25 | 78): These elements give the center-point of the imaging sensor (which, when combined with the field-of-view elements, define where the sensor is pointing) in support of D&R queries.

Security Classification / Classifying Country & Releasing Instructions Country Coding Method / Classifying Country / SCI-SHI Information / Caveats / Releasing Instructions (Tags 48/1-48/6): Classification information is required by D&R systems to determine appropriate distribution limits. This is a fundamental requirement of all data in the NSG.

Object Country Coding Method / Object Country Code (48/12-48/13): These elements support a fundamental D&R query regarding the country being imaged and support security / releasability decisions.

Security Metadata Version (Tag 48/22): This element ensures proper interpretation of the elements that comprise the Security Local Set as the standard evolves over time.

UAS Local Set Version (Tag 65): This element ensures proper interpretation of the elements that comprise the UAS Datalink Local Set as the standard evolves over time.

Motion Imagery Core Identifier (Tag 94): This element is a unique identifier for sensor data that is based upon the composite collection system and enables enterprise management of motion imagery data.